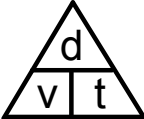


## 1.6 Applications of Linear Systems: dvt Problems

Some strategies:

1. Identify what the question wants. This may tell you one or both of your variables.
2. Remember  $d = v t$ 

3. Use a table to fill in known and unknown values to help form your equations.
4. Make sure your units are all consistent.

Ex.1. Alex drove 500 km from Ottawa to Toronto in 5 1/2 h. He drove part of the way at 100 km/h, and the rest of the way at 80 km/h. How far did he drive at each speed?

	distance (d)	speed (v)	time (t)
Trip 1	x	100	$\frac{x}{100}$
Trip 2	y	80	$\frac{y}{80}$
Total	500		5.5



$$\begin{aligned} \textcircled{1} \quad x + y &= 500 \\ \textcircled{2} \quad \left( \frac{x}{100} + \frac{y}{80} = 5.5 \right) \times 8000 \\ 80x + 100y &= 44000 \end{aligned}$$

Isolate x in ①

$$x = 500 - y$$

Sub ① into ②

$$8(500 - y) + 10y = 4400$$

$$4000 - 8y + 10y = 4400$$

$$\frac{2y}{2} = \frac{400}{2}$$

$$y = 200$$

Sub y = 200 into ①

$$x + y = 500$$

$$x = 300$$

$\therefore$  he travelled 300 km at 100 km/h and 200 km at 80 km/h

Ex.2 Emily travelled 95 km from Oakville to Oshawa by car and

GO train. The car averaged 60 km/h, and the train averaged 90 km/h. The whole trip took 1.5 hours. How long was she in the car?

time

	distance (d)	speed (v)	time (t)
Car	60x	60	x
Train	90y	90	y
Total	95		1.5

$\frac{d}{v} = t$

$$\textcircled{1} 60x + 90y = 95$$

$$\textcircled{2} x + y = 1.5$$

isolate x in  $\textcircled{2}$

$$x = 1.5 - y$$

Sub  $\textcircled{2}$  into  $\textcircled{1}$

$$60(1.5 - y) + 90y = 95$$

$$90 - 60y + 90y = 95$$

$$\frac{30y}{30} = \frac{5}{30}$$

$$y = \frac{1}{6} = 0.17$$

Sub  $y = 0.17$  into  $\textcircled{2}$

$$x = 1.5 - 0.17$$

$$x = 1.33$$

$$\frac{0.33}{1} = \frac{x}{60}$$

Ex.3 A boat took 2 h to travel 24 km down a river with the current and 3 h to make the return trip against the current. Find the speed of the boat in still water and the speed of the current.

	distance (d)	speed (v)	time (t)
Trips downstream	24	$y + x$	2
Trips upstream	24	$y - x$	3
Total		$v = \frac{d}{t}$	

$$\textcircled{1} y + x = 12 \quad \left(\frac{24}{2}\right)$$

$$+ \textcircled{2} y - x = 8 \quad \left(\frac{24}{3}\right)$$

$$\frac{2y}{2} = \frac{20}{2}$$

$$y = 10$$

Sub  $y = 10$  into  $\textcircled{1}$

$$y + x = 12$$

$$x = 12 - 10$$

$$x = 2$$

$\therefore$  the speed of the boat in still water is 10 km/h. The speed of the current is 2 km/h

### Assigned Work:

p.27 # 8

p.55 # 13

p.64 # 7

and the dvt worksheet